

II. REMARKS

A. INTRODUCTORY REMARKS

Following Applicant's election of Group II, claims 7-12, for further prosecution, the Examiner has made the restriction requirement final. Applicant hereby cancels non-elected claims 1-6 and 13-18, and reserves the right to prosecute the subject matter of these claims in one or more continuation applications. Applicant has revised claim 7 to recite R₁, R₂ and R₃ independently is selected from the group consisting of H and CH₃, thereby removing fluorine from the Markush group. Support for this amendment is found in original claim 9, formula (2) - (5), where none of R₁, R₂ and R₃ is fluorine, and the examples. No new matter is presented by the amendment. Accordingly, applicant respectfully requests entry thereof and reconsideration of claims 7-12 in light of the following remarks.

Claims 7-12 are pending in this application. Claims 7-8 are rejected under 35 U.S.C. §102(b), and claims 10-12 are rejected under 35 U.S.C. §103(a). Claim 9 was objected to as being dependent upon a rejected base claim. Applicant greatly appreciates the Examiner's indication that claim 9 would be allowable if rewritten in independent form. Applicant respectfully submits, however, that all of the pending claims are allowable as well for the reasons that follow.

In the outstanding Office Action, page 1, under "Attachment(s)", it was indicated that Forms PTO-1449 from Papers Nos. 3 and 4 were enclosed. However, these forms were not received. It is requested that the Examiner provide copies of these Forms, duly endorsed as indicating that the cited references have been entered into the record, when issuing the next Action in this application.

B. REJECTION UNDER 35 U.S.C. § 102 (b)

Claims 7-8 were rejected under 35 U.S.C. § 102 (b) as being anticipated by WO 96/40798 (or hereinafter "the WO patent") or D'Agastino *et al.* (US-303) or Wodzki *et al.* (Angewandte Makromolekulare Chemie) or Ryzhov *et al.* (Plasticheskie Massy). Office Action, at page 3.

First, the Action asserts that the WO patent discloses a copolymer composition suitably used as membrane material, comprising trifluorostyrene, substituted trifluorostyrene

and substituted ethylene. It was alleged that in prior art copolymer embodiments, the trifluorostyrene can be substituted with SO_3H (i.e., $\text{X}=\text{SO}_3\text{H}$), and Y can be CO_2R^1 , wherein R^1 can be alkyls or perfluoroalkyls. Thus, the Action concludes that the instant copolymer as defined by formula (1) falls within the scope of prior art copolymer. Office Action, at page 3.

Applicant respectfully traverses this rejection. First, the WO patent teaches a different arrangement of the polymer units from that claimed by the Applicant, in that the copolymer composition disclosed by the WO patent has different trifluorostyrene units as designated by the m, n, p, q subscripts with various substituents X, A_1 , A_2 , and A_3 in the phenyl ring. See page 3, lines 12-27, and page 4, lines 1-15, in the WO patent. Second, the trifluorostyrene substituents A_1 , A_2 and A_3 do not contain the sulfonic acid (SO_3H) group and therefore represent a different type of polymer chain. Third, the Y group in the Y substituent on the ethylene subunit does not read on the substituent CO_2R group claimed by the Applicant because the CO_2R group in the WO patent discloses R as perfluoroalkyl groups, which is different from the R group claimed by the Applicant. The addition of hydroxy substituents further distinguishes this claim from the WO patent. Therefore, at least in view of the distinctions between recited properties of the claimed composition and the WO patent disclosure, claim 7 is not anticipated by the asserted WO patent.

The Action also alleges that US 4,012,303 to D'Agostino *et al.* (hereinafter the '303 patent) discloses a membrane material comprising a graft polymer of trifluorostyrene sulfonic acid and tetrafluoroethylene-hexafluoropropylene. It was then asserted that the prior art graft polymer reads on the instant copolymer as defined by formula (1) when r, p, and q are zero, R_1 , R_2 , and R_3 is F, X is trifluoromethyl, and m and n is at least 1, thus anticipating the instant claims. Office Action, at page 3, para. 3.

Applicant respectfully traverses this rejection. The claims have been revised so that R_1 , R_2 and R_3 independently are selected from the group consisting of H and CH_3 . The '303 patent discloses fluorocarbon polymers produced by grafting trifluorostyrene onto base films of tetrafluoroethylene-hexafluoropropylene copolymers. This disclosure fails to anticipate the instant claims, which do not include a hexafluoropropylene or a tetrafluoroethylene monomeric unit. Accordingly, the '303 patent does not anticipate the presently claimed invention.

The Action further asserted that Wodzki *et al.* (hereinafter Wodzki) disclose studies on the permselectivity of ion exchange membranes and that the prior art MRF membrane is produced by grafting trifluorostyrenesulfonic acid onto copolymer of hexafluoropropylene and vinylidene fluoride. It was further asserted that the prior art hexafluoropropylene unit embraces the instant n subunit as discussed in the preceding paragraph. Office Action at page 34, para. 4.

Applicant respectfully traverses this rejection for the same reason stated above with respect to the '303 patent.

The Action also alleges that that Ryzhov *et al.* (hereinafter Ryzhov reference) disclose a trifluorostyrene-based membrane prepared by sulfonation of hexafluoropropylene-vinylidene fluoride or hexafluoropropylene-tetrafluoroethylene copolymers with styrene or trifluorostyrene. Further, it was asserted that the prior art membrane embodiment prepared from sulfonated trifluorostyrene grafted hexafluoropropylene copolymers encompassed the instant polymer membrane represented by the formula discussed above. Office Action, at page 4, para. 1.

Applicant respectfully traverses this rejection for the same reasons as discussed above with respect to D'Agostino *et al.* Applicant's trifluoroethylene subunit is not anticipated by Ryzhov's copolymer because the instant copolymer is made from subunits that are different from the hexafluoropropylene-vinylidene fluoride and hexafluoropropylene-tetrafluoroethylene subunits disclosed in Ryzhov. Thus, the Ryzhov reference does not anticipate the Applicant's claimed invention.

C. REJECTION UNDER 35 U.S.C. § 103

Claims 10-12 were rejected under 35 U.S.C. § 103 (a) as being unpatentable over the WO patent as applicable to claims 7-8. Office Action, at page 4. Further it was asserted that the prior art copolymer membrane anticipates the instant copolymer membrane when $r = 1$, p and q are zero and X is trifluoromethyl (i.e. perfluoroalkyl). It was further asserted that the prior art suggests introducing cross-linking into the copolymer so as to enhance mechanical and physical properties, using conventional cross-linking agents such as divinylbenzene (page 18, lines 8-22), which the Action alleges meet the limitations of claims 11-12. The Examiner further alleged that the prior art polymer membrane is generic to any molecular weight suitable for a membrane material, inclusive of Applicants. Thus, the Action

concluded that it would have been obvious to one skilled in the membrane art to determine the optimum molecular weight. Office Action, at page 5.

Applicant respectfully traverses this rejection. As stated above, the WO patent fails to disclose or suggest the elements recited in independent claim 7. The A₁, A₂, A₃ substituents in the triflorostyrene subunits disclosed in the WO patent are different from the claimed invention. Further, the WO patent does not specifically teach the cross-linking of the polymer as recited in applicant's claim 12. The WO patent does not provide any motivation to cross-link the specific type of polymers. Absent motivation to cross-link these types of polymers, the present invention can not be held to be obvious.

Furthermore, applicant submits that the partially fluorinated copolymer with molecular weight from 30,000 to about 50,000 has been found to be particularly ideal. If the molecular weight of the partially fluorinated copolymer is less than about 30,000 formation of a film is difficult. Additionally, the applicant has found that if the molecular weight of the partially fluorinated copolymer exceeds about 500,000, the solubility of the copolymer in organic solvent is poor. Having failed to satisfy the elements recited in the pending claims, the WO patent can not render obvious claims 10-12. Applicant therefore respectfully requests that the Examiner reconsider and withdraw this rejection.

D. ALLOWABLE SUBJECT MATTER

It was stated that claim 9 was objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims. Further it was stated that the polymer species (2)-(5) as expressed in claim 9 were allowable over prior art of record in the absence of motivation to formulate the specific units in the prior art reference. Applicant acknowledges this comment with appreciation. For the reasons stated previously, applicant respectfully submits that all of the pending claims also are allowable over the cited art. However, compounds 2, 3, and 4 have been rewritten in independent claims with the limitations provided therein of the formerly parent claim 7.

III. REQUEST FOR ALLOWANCE

In view of the amendments and response submitted herewith, applicant respectfully submits that claims 7-12 are in condition for allowance, and a notice to such effect is


respectfully solicited. In the event that any issues remain outstanding, applicant would appreciate the courtesy of a telephone call to the undersigned counsel to resolve such issues in an expeditious manner and to place the application in condition for allowance.

If fee payment is enclosed, this amount is believed to be correct. However, in the event that any additional fees are necessary, the Commissioner is hereby authorized to charge our Deposit Account No. 50-1645.

Respectfully submitted,

LEE & STERBA, P.C.

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PETITION and
DEPOSIT ACCOUNT CHARGE AUTHORIZATION

This document and any concurrently filed papers are believed to be timely. Should any extension of the term be required, applicant hereby petitions the Director for such extension and requests that any applicable petition fee be charged to Deposit Account No. 50-1645.

If fee payment is enclosed, this amount is believed to be correct. However, the Director is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 50-1645.

Any additional fee(s) necessary to effect the proper and timely filing of the accompanying-papers may also be charged to Deposit Account No. 50-1645.